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10/600,777	06/20/2003	Gordon W. Breuker	MHR01 P-301	5947

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EXAMINER	
COOLEY, CHARLES E	
ART UNIT	**PAPER NUMBER**
1723	

DATE MAILED: 11/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/600,777	BREUKER ET AL.	
	Examiner	Art Unit	
	Charles E. Cooley	1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,9-12,14-30,33-37,40 and 42-66* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *15-24,42-60,63 and 64* is/are allowed.

6)☒ Claim(s) *1-3,6,9-12,14,25-27,30,33-37 and 40* is/are rejected.

7)☒ Claim(s) *4,5,28,29,61,62,65 and 66* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 August 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

FINAL OFFICE ACTION

Drawings

1. The drawings were received on 22 AUG 2005. These drawings are approved.

Specification

2. The specification is objected to because paragraph [0027], lines 8-10 are worded in an awkward and unclear manner.

3. The abstract is acceptable.

4. The title is acceptable.

5. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR. § 1.75(d)(1) and M.P.E.P. § 608.01(l). Correction of the following is required:

The underlined subject matter added to each of claims 4, 11, 15, 21, 28, 37, 42, 53, 55, 56, 57, and 58 and the subject matter of new claims 59-66 is supported by the drawing figures and/or inferentially in the written specification but is deemed to lack positive antecedent basis in the specification as originally filed.

608.01(o) [R-2] Basis for Claim Terminology in Description

The meaning of every term used in any of the claims should be apparent from the descriptive portion of the specification with clear disclosure as to its import; and in mechanical cases, it should be identified in the descriptive portion of the specification by reference to the drawing, designating the part or parts therein to which the term applies. A term used in the claims may be given a special meaning in the description. No term may be given a meaning repugnant to the usual meaning of the term.

Usually the terminology of the original claims follows the nomenclature of the specification, but sometimes in amending the claims or in adding new claims, new terms are introduced that do not appear in the specification. The use of a confusing variety of terms for the same thing should not be permitted.

New claims and amendments to the claims already in the application should be scrutinized not only for new matter but also for new terminology. While an applicant is not limited to the nomenclature used in the application as filed, he or she should make appropriate amendment of the specification whenever this nomenclature is departed from by amendment of the claims so as to have clear support or antecedent basis in the specification for the new terms appearing in the claims. This is necessary in order to insure certainty in construing the claims in the light of the specification, *Ex parte Kotler*, 1901 C.D. 62, 95 O.G. 2684 (Comm'r Pat. 1901). See 37 CFR 1.75, MPEP § 608.01(i) and § 1302.01. >Note that examiners should ensure that the terms and phrases used in claims presented late in prosecution of the application (including claims amended via an examiner's amendment) find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description, see 37 CFR 1.75(d)(1). If the examiner determines that the claims presented late in prosecution do not comply with 37 CFR 1.75(d)(1), applicant will be required to make appropriate amendment to the description to provide clear support or antecedent basis for the terms appearing in the claims provided no new matter is introduced.<

Correction is required.

Claim Rejections - 35 U.S.C § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 40 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Amended claim 40: "the exchange angle" lacks antecedent basis.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 2, 9, 10, 11, 12, 14, 25, 26, 33, 34, 35, 36, 37, and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Schneider (US 5,063,027).

The patent to Schneider (US 5,063,027) discloses the recited apparatus and method in Figures 2-4 depicted below and as explained hereinafter (emphasis added by the examiner). More particularly, the patent to Schneider '027 discloses an apparatus for mixing two or more components and more particularly to a method and device for high pressure impingement mixing of two or more reactive components. The components are injected into a mixing chamber containing a reciprocating piston. The mixing chamber opens into a quieting chamber also containing a reciprocating cleaning piston.

The mixing chamber is arranged at an acute angle (alpha) to the quieting chamber so that the components undergo a change in direction of over 90 degrees. Advantageously alpha is significantly less than 90 degrees (which is of a scope considered to encompass the angular ranges recited in the claims).

The apparatus is for mixing at least two reactive plastic components under high pressure in a cylindrical mixing chamber. The plastic components are injected into the mixing chamber containing a reversible piston. The piston serves to control the flow of

the components, i.e., duration of a shot and recirculation, and to clean the chamber by ejection of reactive plastic residues at the end of a shot. A cylindrical quieting chamber follows the mixing chamber and extends at an angle to the longitudinal axis of said mixing chamber. The quieting chamber contains a reversible piston. The mixing chamber and potentially one or more additional mixing chambers are arranged at an acute angle which **may** be significantly smaller than 90 degrees to the quieting chamber in a direction against the output direction of said quieting chamber. The angle may be within a range of about 30 to 60 degrees and may approximate or be 45 degrees. A reversible or reciprocating mixing chamber piston may exhibit a longitudinal groove for each plastic component defining a recirculation path for the plastic or reactive component involved between two successive injections or shots. The openings of the mixing chambers may advantageously be all located in a common radial plane of the quieting chamber.

It is advantageous to a control a mixing device so that in a first mode of operation (mixing position) the mixing chamber piston releases the injection of the reactive plastic components and the other piston partially closes the outlet opening of the mixing chamber (throttling position). According to an alternative mode of operation the mixing chamber piston may be retracted to release the injection of the reactive plastic components into the mixing chamber and the second piston is retracted to a position past the outlet opening of the mixing chamber so that a swirl or mixing space is formed between the frontal surface of the second piston and the outlet opening of the mixing chamber.

The invention is based on the concept of letting one or several mixing chambers open at an acute angle into the quieting chamber in a direction against or to a degree opposite the output direction of the quieting chamber. Preferably all mixing chambers are arranged in a common radial plane. The component mixture or mixtures introduced into the quieting chamber thereby undergo additional intensive mixing by the reverse flow forced upon them. Simultaneously the generation of a spinning flow in the outlet tube is counteracted.

The partial view shown in FIG. 1 of a known mixing head contains a cylindrical mixing chamber 1. A component inlet line 2 for a plastic or reactive component A and a component inlet line 3 for a plastic or reactive component B open into the mixing chamber. The injection orifices 4 and 5 of these component inlet lines 2 and 3 are opened and closed by the mixing chamber piston 6. The piston is guided reversibly or reciprocates in the mixing chamber. The mixing chamber piston 6 is in the mixing position, in which the injection orifices 4 and 5 are open, so that the plastic components A and B meet at high pressure and are mixed intensively. In a recirculating position (not shown) the mixing chamber piston is in an advanced position in which its frontal surface 7 closes the outlet opening 8 of the mixing chamber 1 in a flush manner. When the mixing piston is advanced, the component inlet lines 2 and 3 are connected to or in communication with component return lines 11 and 12 through the recirculating grooves 9 and 10 provided in the mixing chamber piston 6. The components A and B are returned into tanks or reservoirs in the nonmixing or recirculating position. In the mixing phase shown in FIG. 1 the reactive plastic mixture enters the quieting chamber 13

through the outlet opening 8 after a right angle deflection from the mixing chamber 1. A second reciprocating piston 14 is located in the quieting chamber. The piston 14 is shown in a throttling position partially covering the outlet opening 8. The plastic mixture exits at right angles from the mixing chamber in both a throttling and a completely open position of the piston 14 and impacts the wall opposite the outlet opening 8 of the quieting chamber 13. The mixture may tend to continue in a spinning flow D, whereby the flow of the plastic spreads out upon leaving the outlet opening 15 of the quieting chamber 13, thereby producing a spray (arrows 16). This spraying is particularly undesirable in the molding of plastic mixtures or polyurethane foam in open molds, as this may result in the formation of unacceptable air inclusions or bubbles in the finished product.

The above described problems of the devices according to the previous state of the art (FIG. 1) are eliminated as shown in Figure 2 by locating an input mix chamber passageway 101 with an annular cross section at an acute angle alpha to an annular output passageway 113 having a discharge outlet 115. As the plastic mixture injected through first and second nozzles 102 and 103 (see Figs. 1 and 2) is leaving the mixing chamber 101 flows initially at this acute angle alpha against the outflow direction of the subsequent quieting chamber or output passageway 113 and is aligned by reversal and flowthrough into a laminar flow of the plastic mixture. A quieted flow with flow components coaxial relative to the axis of the quieting chamber 113 (arrows 116) appears at the outlet opening 115 of the quieting chamber 113. Air inclusions due to a spray flow, as indicated in FIG. 1 by the arrows 16, can be largely avoided. Further, a

mixing device with such a "y" configuration allows ease of manipulation which may be important for many applications. This is particularly so in open mold applications where maneuverability of the mixing device before, during and after a pour may be required. Maneuvering ease of the mixing device between mold parts may be greatly enhanced by the slim "y" configuration. A cleanout piston rod 114 is located for sliding movement in the output passageway 113. A mixing camber piston rod 106 is located for sliding movement in input mix chamber passageway 101.

FIG. 3 shows the apparatus according to the invention in the mixing position with a piston 214 further retracted over the outlet opening 208 of the mixing chamber 201. The space vacated by the retracted piston leaves a significantly larger swirling space between the frontal surface of the piston 214 and the outlet opening 208 relative to the configuration shown in FIG. 2 where the quieting chamber piston is aligned in a throttling position. The piston 206, located reversibly in the mixing chamber 201, is rotated 90 degrees compared to the embodiment according to FIG. 1, so that only one recirculating groove 209 is visible. A corresponding recirculating groove is located opposite to groove 209. Similarly, in the view according to FIG. 2 and 3 only one injection orifice 103 or 203 is visible. FIG. 4 shows a mixing apparatus in a nonmixing phase. Two mixing chambers 301 and 301' open into a quieting chamber 313. Pistons 306 and 306' are reciprocal in the chambers 301 and 301' . The pistons are shown in the closed or recirculation position, in which the plastic components A and B (FIG. 1) are returned through the recirculating grooves 309 and 309' and the opposing recirculating grooves (not shown) into respective component tanks. The piston 314

located in the quieting chamber 313 is in the foremost or advanced position, in which the plastic mixture, initially put out from the mixing chambers 301 and 301' and ejected by the pistons 306 and 306' in a cleaning stroke, is removed from the quieting chamber 313 at the end of a completed shot.

Claims 1-4 of Schneider (US 5,063,027), part of the disclosure thereof, are reproduced in their entirety below:

> 1. An impingement mixing device comprising:
>
> a mixing chamber housing;
>
> a control piston axially displaceable within said mixing chamber housing between an extended position and a retracted position;
>
> a mixing chamber within said housing defined by an end face of said control piston when in the retracted position and a mixing chamber discharge outlet coextensive with an end face of said control piston when in the extended position;
>
> means for feeding a first component to said mixing chamber;
>
> means for feeding a second component to said mixing chamber in opposing relationship to said first component; and
>
> a discharge tube housing defining a quieting chamber communicating with said mixing chamber and having an opening at a discharge end, wherein said mixing chamber is arranged with a longitudinal axis at an acute angle, alpha, to a longitudinal axis of said quieting chamber.
>
> 2. An impingement mixing device according to claim 1 wherein said angle is in a range from about 30 to 60 degrees.
>
> 3. An impingement device according to claim 1, wherein said angle is in a range between 30 and 60 degrees.
>
> 4. An impingement mixing device according to claim 3, wherein said angle is 45 degrees.

Fig. 2

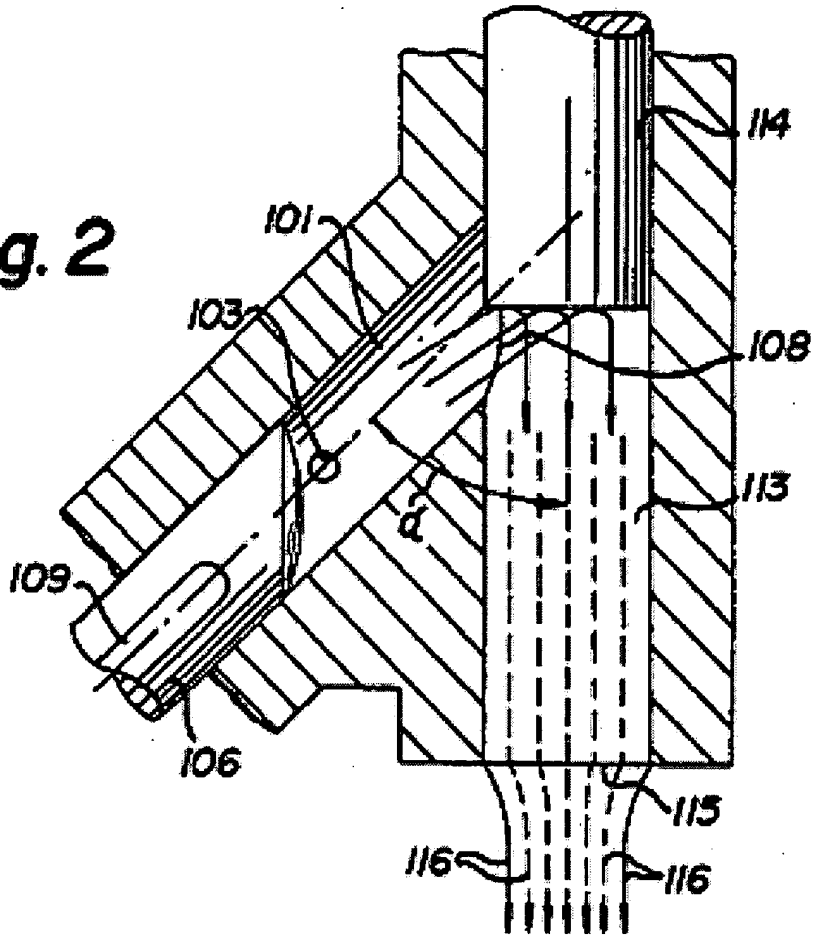


Fig. 3

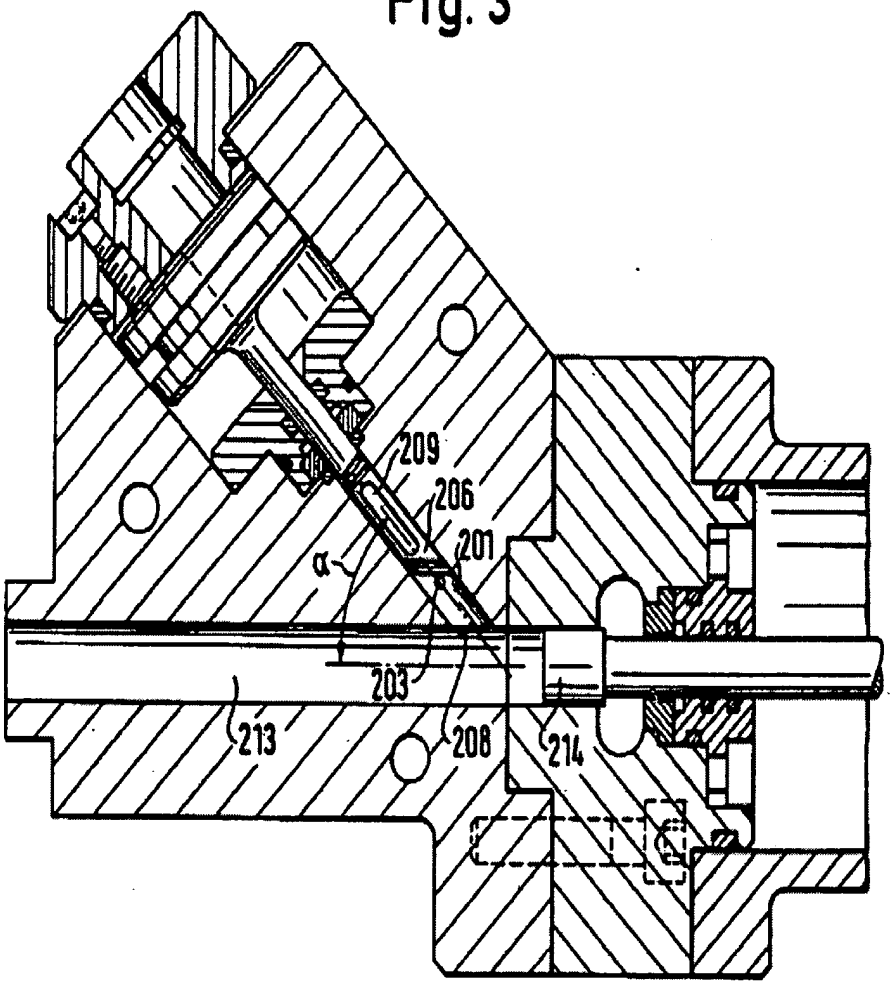
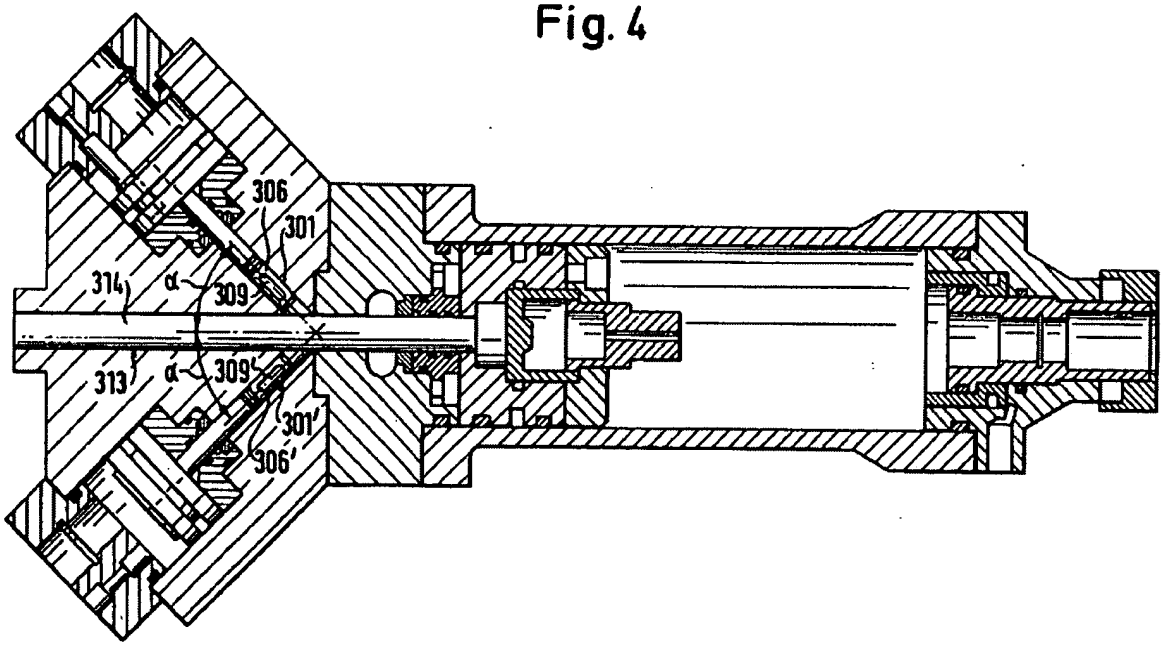


Fig. 4



Claim Rejections - 35 U.S.C § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 3, 6, 27, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schneider (US 5,063,027) in view of Schneider (US 4,440,500).

The patent to Schneider (US 5,063,027) discloses all of the recited subject matter as noted above with the exception of the recited arrangement of the first and second nozzles.

The patent to Schneider (US 4,440,500) discloses the recited apparatus and method - see Figs. 1-4. The housing 10 has an input mix chamber passageway (the horizontal passage between the end faces of 24 and 34 as seen in Figs. 3-4) and an output passageway 12, the input mix chamber passageway communicating with the output passageway (Fig. 4); a first nozzle 52 or 53 for injecting a first fluid into the input mix chamber passageway; and a second nozzle 62 or 64 for injecting a second fluid into the input mix chamber passageway whereby the second fluid can mix with the first fluid to form a mixed fluid; the first nozzle being configured to inject the first fluid into the input mix chamber passageway along a first axial line A-B; the second nozzle being configured to inject the second fluid into the input mix chamber passageway along a

second axial line C-D; wherein the first nozzle and the second nozzle are configured to inject the first fluid and the second fluid into the input mix chamber passageway such that the first fluid and the second fluid meet at an intersection point 32; and wherein thee first axial line and the second axial line are not collinear (Fig. 3); wherein the first axial line and the second axial line are not coplanar (Figs. 3 and 4); and wherein the intersection point 32 is not located along a longitudinal axis of the input mix chamber passageway (Figs. 1 and 4); cleanout piston rod 14; input mix chamber passageway piston rods 24 and/or 34.

More particularly, the patent to Schneider '500 discloses a device for high velocity impingement mixing and dispensing of two or more liquid polymeric reactants, for example polyurethane, in which the mixed reactants are dispensed into a mold cavity or onto a surface.

The invention is a high pressure impingement mixing apparatus for mixing and dispensing two or more liquid components, which provides effective and thorough mixing of reactants and which dispenses a thoroughly mixed, laminar flow emulsion. The device may be used in place of known high pressure reaction injection molding systems without the need for utilizing conventional aftermixers and film gates. The device may also effectively be used in place of low pressure mixing systems in open mold operations, where due to the materials involved high pressure mixing apparatus has heretofore been ineffective.

More particularly, a high pressure impingement mixing apparatus in accordance with the invention includes a mixing chamber, into which two or more reactants are

injected at high velocity, an integral aftermixer chamber arranged to receive the output from the mixing chamber and perpetuate turbulence conditions to effect thorough mixing, and a transfer dispense chamber arranged to receive the mixture from the aftermixer chamber, convert the flow from turbulent to laminar, and thereafter dispense the mixed reactants.

In a preferred embodiment, a mixing head includes a transfer dispense chamber with a hydraulically actuated cleaning plunger therein. The mixing chamber, which receives the reactants, is arranged at right angles to the transfer dispense chamber. Apparatus for introducing the reactants into the mixing chamber for impingement mixing, and for selectively interrupting the delivery of the components, are known. Delivery and interruption of the components is controlled by a hydraulically actuated plunger arranged in the mixing chamber, which when moved to its extended position to block mixing, also purges the mixing chamber of mixed components remaining therein.

The mixing head also includes the cylindrical aftermixture chamber, with a correspondingly arranged hydraulically actuated cleaning plunger. The axis of the impingement mixing chamber meets the axis of the cylindrical transfer dispensing chamber at a right angle. The aftermixer chamber is also at right angles to the transfer dispense chamber. The mixing and aftermixer chambers are arranged on opposite sides of the transfer dispense chamber, such that the output from the mixing chamber is directed across the transfer dispense cylinder into the aftermixer chamber. The aftermixer chamber has a larger diameter than the mixing chamber. Preferably, the

center of the cylindrical aftermixer chamber is such that the flow stream exiting the mixing chamber is directed into the lower portion of the aftermixer chamber.

For dispense operation, the various devices of the mixing apparatus are actuated in the sequence as described below. First, the transfer dispense chamber is opened by retracting the dispense plunger. Second, the aftermixer chamber is opened by retracting the aftermixer plunger. And third, preferably simultaneously with the opening of the aftermixer chamber, the mixing chamber is opened by retracting the cleaning plunger of the mixing device. With the retraction of the mixing chamber plunger, impingement mixing is initiated by the opening of the impingement nozzles to the mixing chamber. The materials dispensed from the mixing chamber leaves the mixing chamber, which is relatively small in cross-sectional diameter, at a relatively high speed and is directed across the transfer dispense chamber where it enters the lower section of the aftermixer chamber.

Once the flow enters the aftermixer chamber, the material encounters the rear wall of the aftermixture chamber (the front face of the aftermixer plunger), where it is deflected back towards the transfer dispense chamber. The deflection occurs mainly in the upper direction because of the arrangement of the chamber and geometry, and the diverted flow is directed back into the upper portion of the transfer dispense chamber. From there, the flow has to pass around the flow stream traveling between the mixing chamber and the aftermixer chamber (i.e. crossing the transfer dispense chamber). Thus, the flow stream exiting the impingement mixing device is initially transferred

across the transfer dispense chamber, to the aftermixer chamber, and thereafter returned to the transfer dispense chamber to be dispensed.

An arrangement in accordance with the invention effects highly turbulent flow conditions, not only in the original mixing chamber, but also in the aftermixer chamber and the upper section of the transfer dispense chamber. The turbulence is maintained by the deflection pattern of the flow stream in the aftermixer, which is facilitated both by the deflection of the flow and also by the continuous counterflowing conditions of the materials in the aftermixer chamber. Turbulence is also maintained in that the mixture, upon exiting the aftermixer chamber and re-entering the transfer dispense chamber, is disposed above the high velocity crossing flow of components leaving the mixing chamber, and to reach the transfer dispense cylinder outlet must flow around this crossing flow. A liquid particle passes statistically several times through the turbulence area before it enters, finally, the transfer dispense chamber.

Once in the transfer dispense chamber and having flowed around the high speed mixing chamber crossing flow, in accordance with the law of continuity the flow in the transfer dispense chamber is slowed down proportionately to the relationship of the flow areas. Prior to reaching the dispensing chamber outlet, the flow pattern becomes laminar so as to leave the dispense opening in a steady, non-splashing stream.

To terminate a mixing cycle, the various plungers are actuated in a reverse sequence. The mixing chamber piston is moved to its extended position, to block the further delivery of reactants into the mixing chamber, thereby terminate mixing, at the same time pushing out the reactants in the mixing chamber. The aftermixer plunger is

then moved to its extended position, to clean out mechanically the aftermixer chamber, and finally the cleaning plunger of the dispense mechanism is actuated for reaming out the remnant material in the transfer dispense chamber.

If desired, the mixing apparatus can incorporate delivery systems for further liquid or gaseous components, for example, coloring agents, catalysts, blowing agents, air or nitrogen. Advantageously, such additives are dispensed into the mixture in the afterchamber, where they are mixed with the main components while the main components are still in turbulent flow conditions.

Referring to FIGS. 1 and 2, a mixing head housing 10 includes a transfer dispense chamber 12, with a cleaning plunger 14 arranged therein, having an outlet 13 for dispensing mixed components. The cleaning plunger 14 is selectively extendable between a retracted position (shown) and an extended position by a piston 16 enclosed in a cylinder 18. The cleaning plunger 14 is actuated by introduction of hydraulic fluid into the port hole 19 or 20

The mixing head housing 10 is also provided with a mixing chamber 22, in which is disposed a cleaning plunger 24. The plunger 24 is displaceable between the retracted position (shown) and an extended position, in which the front face of the plunger 24 extends to the transfer dispense chamber 12, by an actuating piston 26. The mixing chamber piston 26 is enclosed in a cylinder 28, and actuated by the introduction of hydraulic fluid in the port hole 29 or 30. Opposite to the mixing chamber 22 is located an aftermixer chamber 32, which as shown is larger in diameter than the mixing chamber 22. A cleaning plunger 34 is disposed in the aftermixer chamber 32 and is selectively

displaceable between the retracted position (shown) and an extended position in which the front face 35 thereof extends to the dispense transfer chamber 12. The plunger 34, through an associated piston 36 disposed in a cylinder 38, is movable between the retracted and extended positions by hydraulic fluid introduced through port hole 39 or 40.

Referring to FIG. 2, the mixing head housing 10 further includes injection devices 42 and 44 for introducing two pressurized main components "A" and "B" to the mixing chamber 22 for impingement mixing. Preferably each of the injection devices 42 and 44 has structure as shown and described in my prior U.S. Pat. No. 4,239,732, the pertinent portions of which are incorporated herein by reference. In such an arrangement, the two main components "A" and "B" are provided from their respective reservoirs 45 under pressure, by pumps to inlets 46 and 48. The inlets communicate with a longitudinally displaceable plunger 50, each having a longitudinal passage therethrough, such that the individual reactants "A" and "B" pass through the plunger passage and exit the forward end.

In the mixing position shown, where plunger 24 is in the retracted position, the forward ends of the plungers 50 are pressed forward, by the force of the pressurized fluid passing therethrough, against nozzle orifices 52 and 53, which open into the mixing chamber 22. The pressurized components "A" and "B" are accelerated through the nozzle openings 52 and 53 such that the reactive materials are impinged at high velocity in the mixing chamber 22.

Mixing is initiated and interrupted by the retraction and extension of the plunger 24. As the plunger 24 moves to the extended position, flow through the nozzle inlets 52 and 53 is simultaneously blocked to interrupt delivery of the reactants to the chamber 22. Blocking of the flow through the inlet openings 52 and 53 causes the plungers 50 to retract to initiate recirculation of the flowing components "A" and "B" through recirculation lines 56 and 58. Correspondingly, when the plunger 24 is again retracted to initiate mixing, pressure in the reactant delivery plungers 50 causes the plungers 50 to move forward to direct the already flowing component (recirculating) into the mixing chamber. Mixing is initiated and interrupted without lead lag problems, and without creating pressure fluctuations or pulses in the metering systems.

As shown in FIG. 2, the transfer dispense housing 10 may include additional orifices 58 and 60, for introducing additional components "C" and "D" into the aftermixer chamber 32, through inlets 62 and 64, when plunger 34 is retracted.

FIGS. 1-4 show the mixing apparatus in the open, mixing position. The primary components "A" and "B" are supplied by the metering pumps at a pressure of approximately 1500 to 3000 psi to the inlets 46 and 48. FIGS. 3 and 4 illustrate the flow stream of the mixed material. For purposes of simplification, the injection apparatus 42 and 44 are omitted in these figures. The components "A" and "B" enter the mixing chamber, through the inlets 52 and 53, at relatively high velocity. The flow stream of mixed material thereafter leaves the mixing chamber 22 with a relatively high speed (20-50 ft/sec) and is shot across the transfer dispense chamber 12 into the aftermixer chamber 32.

In the aftermixer chamber 32, the flow stream is deflected by 180 degrees at the front face 35 of the cleaning plunger 34. Highly turbulent conditions are achieved. The mixed material is recirculated statistically several times in the area shown in FIGS. 3 and 4 until it is finally discharged at the outlet opening 13 of the transfer dispense chamber 12. As shown in the figures, in addition to the mixing encountered in the aftermixer chamber 32, the mixed material, once it leaves the aftermixer chamber 32, back into the transfer dispense chamber 12, is disposed above the crossing flow from the mixing chamber 22, and thereafter must flow around the crossing flow as it travels toward the discharge opening 13 of the dispense chamber 12. Thus, turbulence is enhanced by the reversal of flow in the aftermixer chamber 32, the counter-flowing mixtures in the chamber 32, and the interaction of the exiting and crossing mixtures in chamber 12.

The dispense transfer chamber 12 is designed to have a length sufficient to allow transition from turbulent to laminar flow conditions prior to the mixed reactants reaching the outlet. The discharge speed can be low as approximately 2 to 5 ft./sec. depending upon the capacity and the flow area.

If the mixing apparatus is provided with inlet nozzles 62 and 64, additional components may be introduced into the turbulent mixture in the aftermixer chamber 32. Such additives can include coloring agents, catalysts, blowing agents, air, or nitrogen.

At the end of a dispense cycle, the operation is interrupted by first moving the mixing chamber plunger 24 to its extended position. Such will block the outlets 52 and 53, and cause the injection devices 42 and 44 to initiate recirculation. The plunger is

extended to a position to be flush with the dispense transfer chamber 22, to mechanically clean out the bore of the mixing chamber 22 of reactant mixture. Once the delivery of the components "A" and "B" is interrupted, the aftermixer plunger 34 is actuated to move it to its extended position. Extension of the plunger 34 likewise cleans the aftermixer chamber 32 of mixed components, pushing such components into the transfer dispense chamber 12. If additional components are being introduced through inlets 60 and 62, extension of the plunger 34 interrupts further delivery of such components. Finally, when both plungers 22 and 34 have been moved to be flush with transfer dispense chamber 12, the transfer dispense plunger 14 is moved to its extended position to push out the remaining mixed reactants from the transfer dispense chamber 12. Thus, the plungers 24, 34 and 14 act to effectively ream out the mixed reactants and clean the device for the next cycle.

To reinstitute the pouring (open mold) or dispensing (closed mold) operation, the plunger 14 is retracted, and after a brief time delay, the cleaning plunger 34 of the aftermixer chamber 32 and the cleaning plunger 24 of the mixing chamber 22 are retracted. This starts immediately the impingement of the reactive components through the orifices 52 and 53 in the mixing chamber 22. If additional components are to be supplied through inlets 60 and 62, the plungers 24 and 34 are preferably retracted simultaneously.

The axes of the mixing chamber 22 and aftermixer chamber 32 are shown as parallel, and the mixing chamber 22 is arranged to be opposite the lower portion of the

aftermixer chamber 32, modifications of the flow direction of the premixed material to the after-chamber, can be made for optimizing the turbulence effect.

Accordingly, it would have been obvious to one having ordinary skill in the art, at the time applicant's invention was made, to have modified the mixing head of Schneider (US 5,063,027) such that the axial lines of the nozzles are not co-linear and not co-planar as taught by Schneider (US 4,440,500) for the purposes of effecting highly turbulent flow conditions in the mixing chamber but inducing a laminar flow pattern downstream so as to leave the dispense opening in a steady, non-splashing stream (col. 4, lines 6-30).

Allowable Subject Matter

13. Claim 40 would be allowable if rewritten or amended to overcome the rejection under 35 U.S.C. § 112.

14. Claims 4, 5, 28, 29, 61, 62, 65, and 66 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims for the reasons advanced by Applicant in the response filed 22 AUG 2005.

15. Claims 15-24, 42-54, 55-60, and 63-64 are allowable over the prior art of record for the reasons advanced by Applicant in the response filed 22 AUG 2005.

Response to Amendment

16. Applicant's arguments filed 22 AUG 2005 with respect to Schneider (US 5,063,027) have been fully considered but they are not deemed to be persuasive.

Applicant is reminded that "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an ipsissimis verbis test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

Turning to the rejection of the claims under 35 U.S.C. § 102(b), it is noted that the terminology in a pending application's claims is to be given its broadest reasonable interpretation (*In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989)) and limitations from a pending application's specification will not be read into the claims (*Sjolund v. Musland*, 847 F.2d 1573, 1581-82, 6 USPQ2d 2020, 2027 (Fed. Cir. 1988)). Anticipation under 35 U.S.C. § 102(b) is established only when a single prior art reference discloses, either expressly or under the principles of inherency, each and every element of a claimed invention. *See Constant v. Advanced Micro-Devices. Inc.*, 848 F.2d 1560, 1570, 7 USPQ2d 1057, 1064 (Fed. Cir.), cert. denied, 488 U.S. 892 (1988); *RCA Corp. v. Applied Digital Data Sys., Inc.*, 730 F.2d 1440, 1444, 221 USPQ

385, 388 (Fed. Cir. 1984). Moreover, anticipation by a prior art reference does not require either the inventive concept of the claimed subject matter or the recognition of properties that are inherently possessed by the prior art reference. *Verdegaal Brothers Inc. v. Union Oil co. of California*, 814 F.2d 628, 633, 2 USPQ2d 1051, 1054 (Fed. Cir. 1987), cert. denied, 484 U.S. 827 (1987). A prior art reference anticipates the subject matter of a claim when that reference discloses each and every element set forth in the claim (*In re Paulsen*, 30 F.3d 1475, 1478-79, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994) and *In re Spada*, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990)); however, the law of anticipation does not require that the reference teach what Applicant is claiming, but only that the claims "read on" something disclosed in the reference. *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 772, 218 USPQ 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026 (1984) (and overruled in part on another issue), *SRI Intel v. Matsushita Elec. Corp. Of Am.*, 775 F.2d 1107, 1118, 227 USPQ 577, 583 (Fed. Cir. 1985). Also, a reference anticipates a claim if it discloses the claimed invention such that a skilled artisan could take its teachings in combination with his own knowledge of the particular art and be in possession of the invention. See *In re Graves*, 69 F.3d 1147, 1152, 36 USPQ2d 1697, 1701 (Fed. Cir. 1995), cert. denied, 116 S.Ct. 1362 (1996), quoting from *In re LeGrice*, 301 F.2d 929, 936, 133 USPQ 365, 372 (CCPA 1962).

With respect to the applied prior art under 35 U.S.C. § 102(b), the examiner has explicitly demonstrated how the reference discloses each and every element set forth in

the claims and how the pending claims read on the disclosure of the reference, hence the rejection is considered proper.

Applicant's primary argument with regard to Schneider (US 5,063,027) is that Schneider'027 does not disclose the recited angles in the claims. However, an analysis of the reference reveals that the angles within Schneider '027 argued by Applicant as being significantly less than 90° (such as 30° to 60° or 45°) are merely examples of arrangements that may be used. The scope of Schneider '027 is not deemed to be limited to such angles that are outside the range of the claimed invention but rather expressly teaches that the angle is an acute angle (or less than 90°) that certainly anticipates the angular ranges within the instant claims.

Note claim 1 of Schneider '027 (reproduced above and part of the disclosure of the patent) only requires the angle to be an acute angle. The dependent claims 2-4 further define the acute angle. The examiner thus concludes that the dependent claims 2-4 that further define the acute angle gives rise to a presumption that the independent claim 1 is not limited to the angles of 30° to 60° or 45° but is of a scope to include any acute angle. Of course, the scope of "any acute angle" anticipates the angles recited in the rejected claims.

Applicant is therefore construing the scope of Schneider '027 much too narrowly. The examiner note that "[t]he use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." *In re Heck*, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting *In re*

Lemelson, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968)). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998) (The court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed."). Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971).

In conclusion, the amendments made in the instant application are not deemed of a substantive nature to define over the prior art to Schneider '027 and thus the rejections are considered proper.

Conclusion

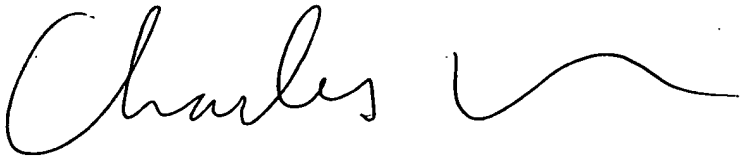
17. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 C.F.R. § 1.136(a).

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS FINAL ACTION IS SET TO EXPIRE THREE MONTHS FROM THE DATE OF THIS ACTION. IN THE EVENT A FIRST RESPONSE IS FILED WITHIN TWO MONTHS OF THE MAILING DATE OF THIS FINAL ACTION AND THE ADVISORY ACTION IS NOT

MAILED UNTIL AFTER THE END OF THE THREE-MONTH SHORTENED STATUTORY PERIOD, THEN THE SHORTENED STATUTORY PERIOD WILL EXPIRE ON THE DATE THE ADVISORY ACTION IS MAILED, AND ANY EXTENSION FEE PURSUANT TO 37 C.F.R. § 1.136(a) WILL BE CALCULATED FROM THE MAILING DATE OF THE ADVISORY ACTION. IN NO EVENT WILL THE STATUTORY PERIOD FOR RESPONSE EXPIRE LATER THAN SIX MONTHS FROM THE DATE OF THIS FINAL ACTION. ANY RESPONSE FILED AFTER THE MAILING DATE OF THIS FINAL REJECTION WILL BE SUBJECT TO THE PROVISIONS OF MPEP 714.12 AND 714.13.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles E. Cooley whose telephone number is (571) 272-1139. The examiner can normally be reached on Mon-Fri. All official facsimiles should be transmitted to the centralized fax receiving number 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Charles E. Cooley
Primary Examiner
Art Unit 1723

3 November 2005